

A LECTURE ON THE OPEN-AIR TREATMENT OF PULMONARY TUBERCULOSIS AS PRACTISED IN GERMAN SANATORIA.

*Delivered at the Hospital for Consumption and Diseases of the
Chest, Brompton.*

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THE system of open-air treatment of pulmonary tuberculosis as practised in German Sanatoria is the title of the lecture which, at the request of my colleagues, I deliver to-day as the introductory one of the clinical course usually given in the summer term at this hospital. The topic is selected as one much discussed at the present moment by the medical profession and even by the public, and, considering the success which has followed the system in Germany, France, and Switzerland, its adoption in some form or other in this country seems highly desirable, and specially in connection with such an institution as the Brompton Hospital.

Treating the consumptive by abundance of open air is no new doctrine, and was apparently in use in ancient times, and more recently many tuberculous patients have regained their health in trekking in ox waggons in South Africa for months at a time, hunting by day and sleeping in the wagon at night; or, again, others have recovered through an open air life in the Australian Riverina, or by camping out while fishing and shooting in Colorado or New Mexico, and all this without the aid of any *Heilanstalt*, and with but irregular and intermittent medical superintendence.

Another form of open-air treatment for the consumptive is the sea voyage, for at sea, at least during the daytime, the patient is probably more completely brought under the influence of the atmosphere than is possible in a sanatorium, for, lying on a chair or lounge on the deck of a clipper or steamer making a fair passage, he inhales not one but a succession of oxygenating atmospheres, and, provided he is kept warm, is greatly benefited thereby. At night, however, his conditions are inferior generally to those of a *Heilanstalt*, as the cabin is small compared to a bedroom, and in rough weather ventilation is often imperfect and open windows impossible.

Turning to the etiology of tuberculosis, it has been demonstrated over and over again, and by none so energetically as the late Dr. MacCormac,¹ of Belfast, that impure air, or as he calls it rebreathed air, is the principal debilitating or predisposing cause which renders the individual vulnerable to the attack of the tubercle bacillus, and we almost invariably find immunity from consumption associated with more or less open-air life, and the presence of the disease in conjunction with close confinement and aggregation of mankind. But let us consider what there is new in the so-called open-air treatment.

We may answer that the principle has been reduced by Brehmer and others to practice in a complete and sensible manner in the various establishments at Görbersdorf, Falkenstein, Nordrach, Hohenhonnef, and others.

Brehmer,² who established his sanatorium at Görbersdorf in 1854, laid down as rules that such institutions should be situated (1) in the mountains, and (2) in districts with immunity from consumption. Brehmer adopted Küchenmeister's theory of fixing the elevation of immunity from phthisis for each degree, and even fraction of a degree, of north and south latitude; which for the latitude of Germany and Switzerland requires an addition of 375 feet for each degree as the equator is approached. Brehmer considered that an altitude of 500 metres was sufficient in Germany, and 1,500 to 1,700 metres in Switzerland. Brehmer was led on this account to settle at Görbersdorf, in Silesia, at an elevation of 560 metres (1,800 feet). This immunity theory has long ago been exploded, for it has been shown (1) that the death-rate from phthisis depends on the density of the population in a given district, even among mountains; and also (2) that there are localities free from phthisis which, like the Khirgis

Steppe, are below sea level. Brehmer had another erroneous theory—that consumption was caused by the heart being too small to nourish the lungs properly, and that mountain air cured consumption by stimulating the heart's action to greater exertion.

However, it is admitted now that these views were wrong, and that some of the characteristic effects of a mountain climate are not to be obtained at so low an altitude as that of Görbersdorf, and though excellent results are produced there, the success must be attributed chiefly to the system of treatment. At moderate elevations, such as Görbersdorf and Falkenstein, the air is purer and contains fewer microbes than at sea level, but for the arresting power of a mountain climate, as seen in the Andes and at Davos and St. Moritz in the Alps, it is found that an altitude of at least 5,000 feet is necessary. According to my experience the results of residence at these altitudes far surpass those of open-air treatment alone.

But to return to the system. Brehmer laid down as laws: (1) That the sanatorium, to avoid dust, should be away from public traffic; (2) that the air should be dry and aseptic, and yet that there should be abundant rainfall. His other climatic conditions, such as diathermancy and low barometric pressure, hardly apply to low elevations. The leading principle of the treatment is that the consumptive should pass the greater part of his time in the open air, protected from weather, and as a rule in the prone position, and that at night he should sleep with windows open.

This is carried out either in covered balconies or terraces with one side open, or in pavilions, some of which are arranged to rotate, and thus to enable the invalid to be always protected from wind and exposed to sunshine. The covered terraces or *Liegenhalle*, as they are called, are of considerable depth and height, and the drifting rain and snow are kept out by curtains and the too intense sun heat by blinds. The patients lie out for seven to eleven hours a day, only moving for meals and exercise, and going indoors at night. Thus protected, all kinds of weather, frost, snow, rain, hail, damp, and fog have to be borne, and are well borne, provided only the patients are duly covered up in furs and wraps. At Falkenstein the cold of winter is not complained of, but only the fogs which roll up from the plain below.

To resist cold the prone position is far better than sitting, probably on account of the equalising effect it has on the circulation of the body and the less strain it exerts on the heart. People can endure degrees of cold when lying down which would cause chill in a sitting posture. When I visited Dr. Turban's well-known sanatorium at Davos in December, 1891, there was thick snow on the ground, and the temperature was -4° F., but I found a large number of patients clothed in furs lying out in the *Liegenhalle*, reading by electric light, and playing chess and draughts after sunset. I made a point of feeling their hands and feet, and rather to my astonishment, I found them perfectly warm, though for hours they had been exposed to this freezing atmosphere. I was told both there and at Falkenstein that though hot bottles were always to be had, they were seldom asked for. This life of reclining in open air hardens the invalid against fresh cold, increases the appetite, promotes sleep, reduces night sweats, but most important of all, lowers pyrexia. I know of no more certain means of reducing the high temperature of acute tubercularisation, no matter what the condition of the lung, than the open-air treatment, and it succeeds when all medicinal agents have failed.

The objections to the reclining system are that in advanced consumptive cases it is not well adapted for clearing cavities by expectoration, and there is risk of the secretion from the cavity, instead of being expectorated, falling back into another bronchus, and thus infecting a fresh centre. A second objection—and this applies to incipient disease—is that without exercise it is impossible in the large proportion of patients to maintain the muscles and functions of the body in proper order.

Brehmer was always much in favour of exercise, and specially of hill climbing, but among his disciples there appears to be a difference of opinion, some holding to the *Liegenhalle* system alone, and others strongly urging hill climbing and certain forms of pulmonary gymnastics. At all

the establishments there are graduated ascents to some neighbouring height, and the amount of exercise is regulated day by day for each patient, who is enjoined during ascents to go slowly, to refrain from talking as far as possible, to breathe through his nose, and to stop short of actual fatigue, only walking so far as his physician ordains.

Forced respiration or lung gymnastics is carried on in some establishments, and is recommended by Dettweiler³ to be practised as follows:—During steady walking, take 5 or 6 deep breaths through the nose every 100 or 150 paces, or when lying in the open air take 10 or 12 deep breaths every five or ten minutes.

The dietetic treatment pursued in these *Heilanstätten* is that of stuffing with a rich and varied diet, including much meat, milk, fatty, and farinaceous foods and vegetables, given in large quantities at a time, with in most cases moderate intervals between meals, but sometimes very frequently. Dr. Smythe,⁴ who was himself an inmate of the Nordrach Sanatorium for a year, describes it: "The patient eats double the amount of food he desires. Patients are not infrequently sick after a meal, and if this happens they return and finish the meal, finding no difficulty in retaining the remainder."

Under this system a gain of 2, 3, and 4 lbs. a week takes place, and often before the patient's departure upwards of 2 stones have been gained. That this addition should be not mere fat, but muscle and bone and nerve tissue, exercise is essential, and this is recognised by many of the sanatoria in their constructing winter gardens and colonnades for indoor exercise to be taken when the weather precludes outdoor.

Brehmer recommended hydropathy to be combined with the open air treatment and specially douches to the thorax, which he used to administer with his own hand at Görbersdorf. They were given partly to stimulate the respiratory muscles and induce the patient to take deeper breaths, and partly to harden against catarrh. Cold friction is also largely used, that is, enveloping the patient in a sheet wrung out in cold water, then rubbing the whole body rapidly and firmly, and wrapping the patient in a second dry sheet and rubbing him again. Afterwards a good walk in open air is ordered, or, failing this, in the winter garden.

In the internal arrangements of these sanatoria, the greatest stress is laid on a complete system of disinfection. Linoleum is used for the floor covering, the walls are painted with oil colours, or are inlaid with wooden panels, or papered with washable materials. Electric light is used, and the heating is done by hot water or steam pipes, or else by the ordinary German stoves. Ventilation appears generally to depend on windows opening upwards, or else, as in Turban's sanatorium at Davos, at a lower level. The air is heated, and admitted into the rooms some 4½ feet from the floor level. The exits for the impure air are not near the ceiling as usual, but low down, about 1 foot above the floor, the reason assigned being that owing to the cold external climate the warm air would continually ascend to the top and escape, leaving the cold air where the patients sit, but by this arrangement it gradually descends, giving off some of its heat inside instead of outside.

The sputum is received into vessels mixed with strong disinfectants, or else into Dettweiler's sputum flasks, which the patients carry with them; and it is afterwards burnt. The linen, table knives and forks, and spoons of the patients all undergo elaborate disinfection.

The floors are not swept, but swabbed with damp cloths every day to prevent dust. In the construction of the rooms and passages, and especially the wainscoting, all corners likely to harbour dust are carefully avoided and usually filled in, and this is a hint we might well adopt in our hospitals.

The sputum is frequently examined for tubercle bacilli in all the sanatoria, and at Nordrach, when after repeated examinations none can be detected, a cubic centimetre of the sputum is injected under the skin of a guinea-pig, and if, at the close of a period varying from three to six weeks, no tuberculosis follows, the patient is considered fit to return home.

In all these establishments the patient is under the personal supervision of the doctor, who orders every detail of his life, enforces his rules—especially at meals, when he is of course present—visits him two or three times a day, and has, in Dettweiler's words, to make of the sanatorium "his religion, his politics, his despair, and his delight."

The principal sanatoria are Görbersdorf, where are three establishments; Falkenstein in the Taunus, Hohenhonnef in the Siebengebirge on the Rhine, Reiboldsgrün in Saxony, St. Blasien in the Black Forest, Nordrach also in the Black Forest, nine miles from Biberach Zell; Schoenberg in Württemberg, Rehburg near Hanover, St. Andreasberg in the Hartz Mountains, and other smaller ones. Besides these there are in Switzerland Dr. Turban's sanatorium at Davos and one at Arosa, the sanatorium at Leysin in the Canton Vaud; and in the Pyrenees Dr. Sabourin's on the Canigou, and others, besides several in the United States of America. It is not my intention to describe these establishments in detail, as there is a careful account of them appearing in a report upon open-air sanatoria for phthisis in the *BRITISH MEDICAL JOURNAL*; but I only wish to consider how far we can adopt the open-air treatment of consumption in this country.

There is no reason why a certain number of sanatoria for upper class patients should not be established in the United Kingdom. On the South Coast, or on the hills of Surrey, Sussex, or Hampshire; or again on the Wharfedale of Yorkshire, the Malvern Hills, or the mountains of the East Coast of Scotland, are plenty of appropriate sites. A certain number of consumptives, chiefly those without families, who do not wish to go abroad, would gladly avail themselves of such institutions, and there is the advantage in these establishments of example, a powerful assistance in carrying out the doctor's directions, and the society of other invalids may be an inducement to some, though this is perhaps not an unmixed blessing, but the great gain is the personal superintendence of the medical men experienced in similar cases.

There are at present several small establishments started, two at Bournemouth alone, and the treatment is being also admirably carried out at Cromer by Dr. Burton Fanning,⁵ who has recently published his results.

However, English people as a rule, and particularly English ladies, do not like sanatoria, or any institution of the kind where they have to live always in public, and especially when they are ill, preferring, if possible, the congenial family life.

English and Americans are intelligent patients enough if their condition and the required treatment is properly explained to them, and they do not require the minute rules and constant supervision which our German brethren appear to find necessary. I confess that during a large experience of pulmonary tuberculosis in hospital and private practice, extending over thirty-four years, I do not remember many cases of phthisis that would have benefited from having three visits a day from the doctor; but there must be proper medical supervision, and the details of the patient's life must be rigorously laid down.

It is obvious that if we want to introduce the open-air treatment largely into England, we must, if it can be done without sensibly impairing its utility, modify it to suit the spirit and habits of the people, and this is easy enough. There is no reason why it should not be carried out in country houses, or even in suburban ones.

The rules of dietary and the regulation of disinfection are already often laid down by English medical men, and for reclining in the open air all that is wanted is a wooden shed with sides or shutters, which can be partly removed, so that one side is always open to the air, erected in the garden; or a verandah or a covered balcony facing south, sufficiently deep to allow of a couch being introduced for the patient to lie on. This should look on a garden to ensure pure air and privacy, and avoid dust. If there be no such verandah or covered balcony, a tent similarly arranged will answer the purpose, and you have the elements of the *Liegenhalle*.

If there be no fever, and the disease be not very advanced, exercise is highly desirable, but the patient, after returning from the walk, must go back to his verandah or shed, and not to the drawing-room or indoors.

I will now give a sketch of two private cases which were, at my suggestion, treated by the open-air method, with excellent results. On March 26th, 1896, I saw, in consultation with a medical man in Sussex, a high-spirited young lady, aged 15, who had apparently been overstudying, and for the last three weeks had been pyrexial, the temperature rising between 12 and 6 P.M. to 102° and 103° F. Her aspect was flushed, her pulse rapid. There was some wasting and slight

cough, but no expectoration, the catamenia were present but irregular. I detected some crepitation on cough in the first intercostal space on the right side, and made a diagnosis of acute pulmonary tuberculosis with doubtful prognosis. Quinine and cod-liver oil was prescribed, but the open-air treatment was strongly urged. A sheltered nook of the garden, where the dwelling-house acted as a protection from northerly and easterly winds, was selected, and here was erected a wooden shed of sufficient size to hold a comfortable sofa, a table, and a few chairs; it was fitted with sides, removable according to the necessities of wind or rain.

In this shed our patient lay on the sofa, well wrapped in warm clothing and coverings, for eight or nine hours every day, and she slept at night in a lofty bedroom with the window open. In the course of four weeks of this treatment the temperature had fallen to under 100° F. and gradually subsided to within normal limits, only rising above them during the menstrual periods. Cough became more troublesome and was accompanied by yellow sputum, in which a few tubercle bacilli were detected. The patient gained 2½ lbs. and looked much improved; weight 7 st. 13 lbs.

I saw her next in her shed June 20th with her medical attendant, and found her looking stouter and less delicate, with a pulse from 70 to 80, temperature normal, cough still troublesome, and expectoration scanty. She had been nearly three months in the open air and liked it. The lungs showed well-marked disease of both apices, and on the left side the signs extended to the lower lobe (upper border); weight the same.

In August, after continuing the same treatment, I found the physical signs had diminished considerably, the right lung being clear, and in the left lung the area of crepitation was smaller. As her home was not a favourable wintering place a villa with a garden and pine trees was taken at Bournemouth, and hither she was transported, shed and all, and there she spent the winter of 1896-7, a remarkably windy and wet one, in the open shed, as at her home, with great advantage.

When I saw her in May, 1897, she had grown taller, weighed 9 st. 6 lb., and looked the picture of health. Her chest had become larger and deeper; cough and expectoration were slight; no tubercle bacilli could be found in the latter. The right lung was clear, but some crepitation was still audible above the left scapula. She returned to her home, and was able to ride on horseback through last summer and winter.

Her medical adviser reported to me that she was quite well all through the winter and did not require any special treatment, but at the beginning of March caught cold and lost her voice, and there was a return of cough with slight expectoration, which contained tubercle bacilli. A return to the open-air treatment seems to have been successful in stopping these symptoms, and now (May 1st, 1898) she is well, weighing 9 st. 4 lb., and has grown considerably.

Another case was that of a lady nurse, aged 27, who had been under my charge for two years for heart disease, and, after an attack of influenza and considerable worry as matron of a nurses' home, developed tuberculosis of the left lung, the physical signs being chiefly confined to the lower lobe, and accompanied by pyrexia and much pleural pain and dulness on percussion. I saw her on February 8th, 1897, with Dr. Gale, at Kingston, and at my request he aspirated the left side for fluid, but with negative result. Later on the physical signs indicated a spread of lung tuberculosis upwards, the crepitation appearing at the apex as well as at the base. The pulse was always from 100 to 120, the respirations quickened and often painful, and the temperature continued to rise every afternoon to 100°, 101°, and even to 102° F., with a sub-normal record in the morning—in fact, presented a typical chart of phthisical pyrexia—and this continued in spite of all medicinal treatment. The patient wasted considerably, suffered from night sweats, and the cough was troublesome and the expectoration almost nil.

As the patient's condition was worse and the continuous pyrexia was greatly distressing her—for it had lasted for ten weeks—I urged the open-air treatment; but the conditions were not very promising, as the only available space for the practice was a small walled yard at the back of the nursing home. Here, however, a tent was erected, furnished with a

couch and table, and the patient was carried down and placed in it for several hours every day.

She at once commenced to improve; the temperature began to fall, the pyrexia assuming an intermittent character, the night sweats ceased, the pulse became less frequent, and cough and pain in the side less. In fourteen days she was removed to a house with a garden in Surrey, and later to a ladies' home in Bournemouth, all this time the open-air treatment being steadily persevered with. The journey to Bournemouth caused a rise of temperature, but when she was settled there it fell to normal, appetite improved, and weight was gained. The physical signs indicated some clearing up of the base of the left lung; but loud crepitation was most marked in the upper lobe, especially in the supra-scapular region; weight 8 st. 12 lb.

In August she spent five weeks at Margate, not following the open-air régime, but was not so well, there being some return of the afternoon pyrexia, 101° F. being once recorded, but this ceased on return to the open-air treatment for a short time.

April 30th, 1898. The patient has been on the west coast of Ireland all the winter, living a good deal out of doors, though not carrying out the open-air system as before, and has been remarkably well with the exception of slight pharyngitis and aphonia. The cough and expectoration are moderate.

As to the physical signs, crepitation is well marked at the left apex, but quiescent at the left base. Weight 10 st., being a gain of 16 lbs. Pulse and temperature normal. Breath a little short, but she can walk two or three miles a day.

These two cases exemplify to some extent the influence of the open-air treatment. The first was an instance of acute tubercularisation of the lungs, and considering the obstinacy of the pyrexia, the obscurity of the physical signs, and the scanty expectoration, there is little doubt that it presented the usual unfavourable aspect of that variety of consumption. Nevertheless, under the open-air treatment, a nearly complete arrest has been attained.

The second case was also an instance of acute tuberculous disease, with an insidious origin and course, which was undoubtedly checked by persistence with the open-air treatment, though the circumstances under which it was carried out were far from favourable. I know of several other cases where the system has been carried out in private houses successfully, under the care of persevering and energetic practitioners, of whom we have as many in England as in any country.

The system should be tried in all our hospitals and homes for consumption which are situated in the country or by the seaside, as it is at the present moment being tried at Bournemouth and Cromer. It should also be carried out in sanatoria arranged specially for the upper classes; and lastly it should be introduced into private families living in the country or at the seaside, under the direction and supervision of the medical attendant, care being taken that all rules of exercise and dietetics be vigorously enforced.

[At the close of the lecture a demonstration was given of a temporary *Liegenhalle*, which had been fitted up in the court of the hospital.]

REFERENCES.

¹ Consumption and the Breath Rebreathed, 1872. ² Die Therapie der chronischen Lungenschwindsucht. ³ Von Jaruntowsky, Sanatoria for Consumptives, translated by Dr. E. C. Beale. ⁴ BRITISH MEDICAL JOURNAL, April 30th, 1898. ⁵ Lancet, March 5th and 12th, 1898.

A HISTORIC GRANT FOR SUCCESSFUL INOCULATION.—The late Mr. Robert Dimsdale, who had been a member of the House of Commons in three Parliaments, was a descendant of Dr. Dimsdale, a famous inoculator of the eighteenth century, on whom the title of Baron Dimsdale of the Russian Empire was conferred by the Empress Catherine for inoculating her against small-pox. For his services he received a fee of £10,000, which has been estimated as equal to at least three times that sum at the present day, and £2,000 as an allowance for travelling expenses. He was also appointed Councillor of State and Physician to her Imperial Majesty, with an annuity of £500, which was punctually paid him till his death in the early years of the present century.